



The Road Not Taken

Two roads diverged in a yellow wood,
And sorry I could not travel both
And be one traveler, long I stood
And looked down one as far as I could
To where it bent in the undergrowth;

Then took the other, as just as fair,
And having perhaps the better claim,
Because it was grassy and wanted wear;
Though as for that the passing there
Had worn them really about the same,

And both that morning equally lay
In leaves no step had trodden black.
Oh, I kept the first for another day!
Yet knowing how way leads on to way,
I doubted if I should ever come back.

I shall be telling this with a sigh
Somewhere ages and ages hence:
Two roads diverged in a wood, and I —
I took the one less traveled by,
And that has made all the difference.

— Robert Frost



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ROAD Tales



How it all began...

When birds fly or fish swim, they leave no visible trails behind. When animals move, they leave behind trails. So do human beings.

Early roads began from the dirt tracks that animals and humans made, as they went about hunting for food and water. Gradually, over the years, the trails grew broader and firmer, and it became easier for people as well as carriages, to travel on them.

Many a times, a road has stirred up the wanderlust in man. Indeed, the road can be

as inviting to an adventurous soul, as the sea is to a seafarer.

Some roads like the Grand Trunk Road and the Silk Road seem to go on endlessly, winding around mountains and leaping over streams and rivers.

Often, a traveller wishes to carry on his journey long after the road ends. He leaves behind a fresh trail..... and, the saga of the road continues.

This booklet is a tribute to the adventurous souls down the ages who could not resist taking the road.



Early Trails

'One day through
primeval wood
A calf walked home, as
good calves should
But made a trail all
bent askew
A crooked trail as all
calves do...
And from that day o'er
hill and glade
Through those old
woods a path was
made.'

—Sam Walter Foss

The first roads were trails made by animals as they went in search of food and water. The grass they trod on wore off gradually, forming rough pathways. Most of these led from feeding grounds to watering holes. Early man followed these dirt tracks to hunt animals. Later, as he went about gathering food, he made his own trails. The trails became popular as more people followed them.

A traveller in an unknown land, as a Sanskrit saying goes, takes the trail walked by others before him.

The First Roads

Roads were convenient not only for traders, but also for pilgrims, students and others commuting from one place to another.

The trails gradually developed into proper pathways as man began to lead a settled life. He levelled off the ground and made it firm so that it was easy to walk on, and smooth enough for animal-driven carts to ride on.

As trade brought in prosperity, rulers found it prudent to build network of roads that connected one part of their kingdom to another.



Mohenjo-daro ruins

The Indus Valley Roads

Toys found in the excavated sites throw light on the life of the people in the valley.



Harappa and Mohenjo-daro, the two ancient cities in the Indus valley, serve as models of urban planning. Both cities had broad, brick roads for wheeled traffic and pedestrians.

The main arteries were 10 metres wide, while the feeder roads were around two metres wide. The roads intersected at right angles, dividing the city into square and rectangular-shaped blocks.

Mauryan Roads

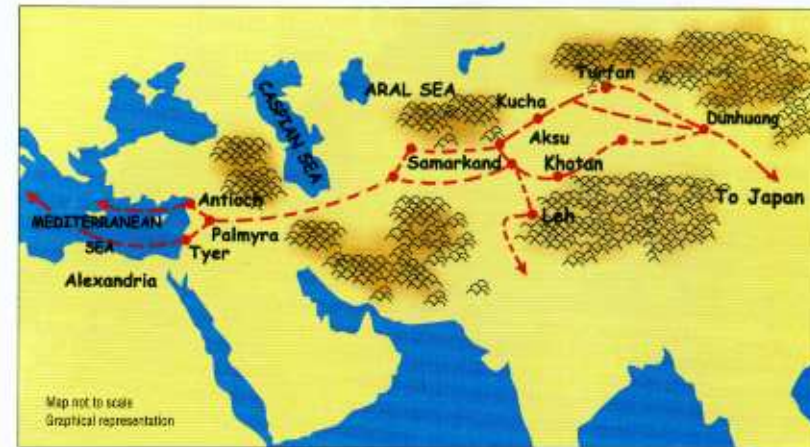
Megasthenes, a Greek traveller who visited the country during the reign of Chandragupta Maurya, was impressed with the roads he saw there. Many roads had milestones to indicate distance. The road that he admired most was the 1,860-km long Royal Road, connecting the North-West Frontier to the Mauryan capital, Pataliputra.

A graphic picture of the plan and layout of an early Indian city is seen in the *Milinda-panha*. The city is described as “fine and regular, measured out into quarters ... with crossroads, street-corners and public squares, with main roads, well provided with parks, gardens, lakes ...”

In his rock edicts, Emperor Ashoka described the roads he built :

“Along roads I have had banyan trees planted so that they can give shade to animals and men, and I have had mango groves planted. At intervals of eight *kosas*, I have had wells dug, rest-houses built, and in various places, I have had watering-places made for the use of animals and men.”

— Pillar Edict 7



Silk Road

Besides traders, pilgrims, monks, soldiers and nomads also found it convenient to travel on the silk route.

Long before the sea route to India was discovered, European traders relied on the Silk Road to trade with Asian countries. A network of trade routes connected China, India and Western Asia with Constantinople, the ‘gateway to Europe’.

All along the 9,700-kilometre long silk route, there were caravan tracks, exchange posts and bazaars, where silk, satin, musk, rubies, diamonds and pearls were bought, sold or bartered.



Nalanda University, where Hiuen-Tsang spent three years studying the Buddhist scriptures.

Hiuen-Tsang's Route

In ancient China, 'going west' meant setting out on a journey to India, to the land of the Buddha. Hiuen-Tsang, the seventh century Chinese Buddhist monk, travelled to India, during the reign of King Harshavardhana, in search of the *sutras*.

The great Buddhist scholar took the Silk Road from China through Central Asia to reach the land of the Buddha. In the course of his travels, he met many rulers and visited several holy Buddhist sites. His journey,

however, was far from easy. On the way, he had to suffer many hardships such as travelling through desolate deserts without any food or water, facing snow storms and encountering highway robbers.

Hiuen-Tsang returned to China with the *sutras* nineteen years later. His verbal accounts of his voyage were compiled into a book called "Journey to the West In the Tang Dynasty" by his disciple, Bien-Ji.

The monumental work was acclaimed to be 'a unique and unprecedented historical account'.



- A skull relic said to be that of Hiuen Tsang's was brought to the Nalanda university in 1956. The relic is now in a museum at Patna in Bihar.
- In Nalanda, there's a nine-metre high statue of Hiuen-Tsang. It was erected to commemorate the great monk's historic visit to the place.

The Khyber Pass

The Khyber Pass is the famed mountain pass, through which invaders like Alexander the Great, Timur the Lame, Babur, Mahmud of Ghazni and Nadir Shah entered India. It was, and is even today, an important trade route between Central and South Asia.

The narrow mountain pass connects Pakistan to Afghanistan. It is 53 kilometres long and barely three metres wide at its narrowest point. It starts from Jamrud in Pakistan, winds its way across the northeastern parts of the Safed Koh or 'the white mountains' and ends west of Torkham in Afghanistan.

In the early half of the 20th century, the British built an asphalt road and a railway line along the pass. With 34 tunnels and over 92 bridges and culverts, these were regarded as engineering marvels of the time.





Roads in Rome

The Romans were the first to recognize the importance of roads in commerce and military expansion and to perfect the art of road building. Their road system was regarded as one of the greatest engineering accomplishments of the time.

The Romans built more than 80,000 kilometres of roads in their empire. Some of the roads, like the Appian Way, are still in use. The main purpose of building the roads was to transport soldiers from one part of the empire to another.

Roman roads ran in almost straight lines and passed over hills instead of cutting around them. The soldiers were given the task of building roads. Before constructing a road, they would mark a straight line with the help of a groma, a cross-shaped wooden tool with lead weights attached to the ends.

After clearing the ground of rocks and trees, the soldiers would dig out trenches, fill them

with stones and layer them with sand and pebbles. They would then pave the surface with flat stones and kerb both sides of the road.

A remarkable feature about these roads was that they were built at a height and made to slope slightly from the centre toward both sides. This helped to drain off water. The roads had ditches on either side to carry the water away.



Roads played a major role in Roman expansion, giving rise to the expression, 'All roads lead to Rome'.

Peruvazhi

'Rajakesari Peruvazhi', also known as 'Kongu Peruvazhi', was once a popular Roman trade route.

In ancient times, there was a good network of roads in South India. While kings built roads, the responsibility of maintaining them fell on local authorities. Almost all the roads were more than seven metres wide. They had paths on either side for people to walk on.

A 'Peruvazhi' or 'main road' connected major cities in ancient Tamil Nadu. It was lined with shady trees and stone benches called *summai thangi*, on which weary travellers could keep their bags and take rest.



The Wanderers

One group of people who love to hit the road is the Gypsies. They are wanderers, whose ancestors originally lived in India. Gypsies left India in the 10th century for West Asia, and moved on to Europe some time in the 14th century.

There are roughly 35 million Gypsies in the world today. They belong to various tribes. The largest tribe is the Rom. They live in almost every part of the world. Lambadis are common in India, Tziganes in Hungary and Gitanos in Spain.

While Gypsies follow different professions and speak different languages, the one thing that binds them all is their need to wander. They simply cannot resist the road.

Gypsies love to sing and dance. Since they claimed to have come from a country called 'Little Egypt', the Europeans called them Gypsies, a shortened form of Egyptians.

The Grand Trunk Road

Sher Shah Suri might have derived inspiration from the much older Mauryan roads connecting capital Pataliputra (modern Patna) with Taxila, now in Pakistan.



The Grand Trunk Road or the G T Road is the oldest and the longest road in the Indian subcontinent. It spans a distance of more than 2,500 kilometres, from Sonargaon in Bangladesh to Peshawar in Pakistan. The road connects the cities of Kolkata, Varanasi, Kanpur, Delhi, Amritsar, Lahore, Rawalpindi and Peshawar.

The GT Road began as *Sadak-e-Azam* or the 'great road'. It was built by Sher Shah Suri, who ruled North India, with Agra as his capital, between 1540 and 1545. Rulers after Sher Shah Suri, further extended the road. It was the British, who gave it its present name.



Lasting Roads

Vibrating rollers are used to shake roads. When roads are concreted, they need to be shaken to enable the concrete to fill up crevices and prevent air pockets from forming.

Asphalt is a residue got from the distillation of crude oil. It is also called pitch. It's used as glue or binder on the top layer of roads. Asphalt does not allow water to pass through it. When roads are covered with asphalt they are protected from rainwater, which would otherwise wash away the mud and stones, and leave potholes behind.

Salted Wet Roads

Water freezes at 0°C . However, if there is an impurity in the water, it freezes at a lower temperature. In cold countries, salt is spread on roads to prevent ice formation on wet streets when the temperature drops to zero or below. A mixture of salt and water has a lower freezing point than pure water. The more the salt, the lower the freezing point so when a lot of salt is dropped on the roads, no ice is formed even when the temperature drops several degrees below zero.



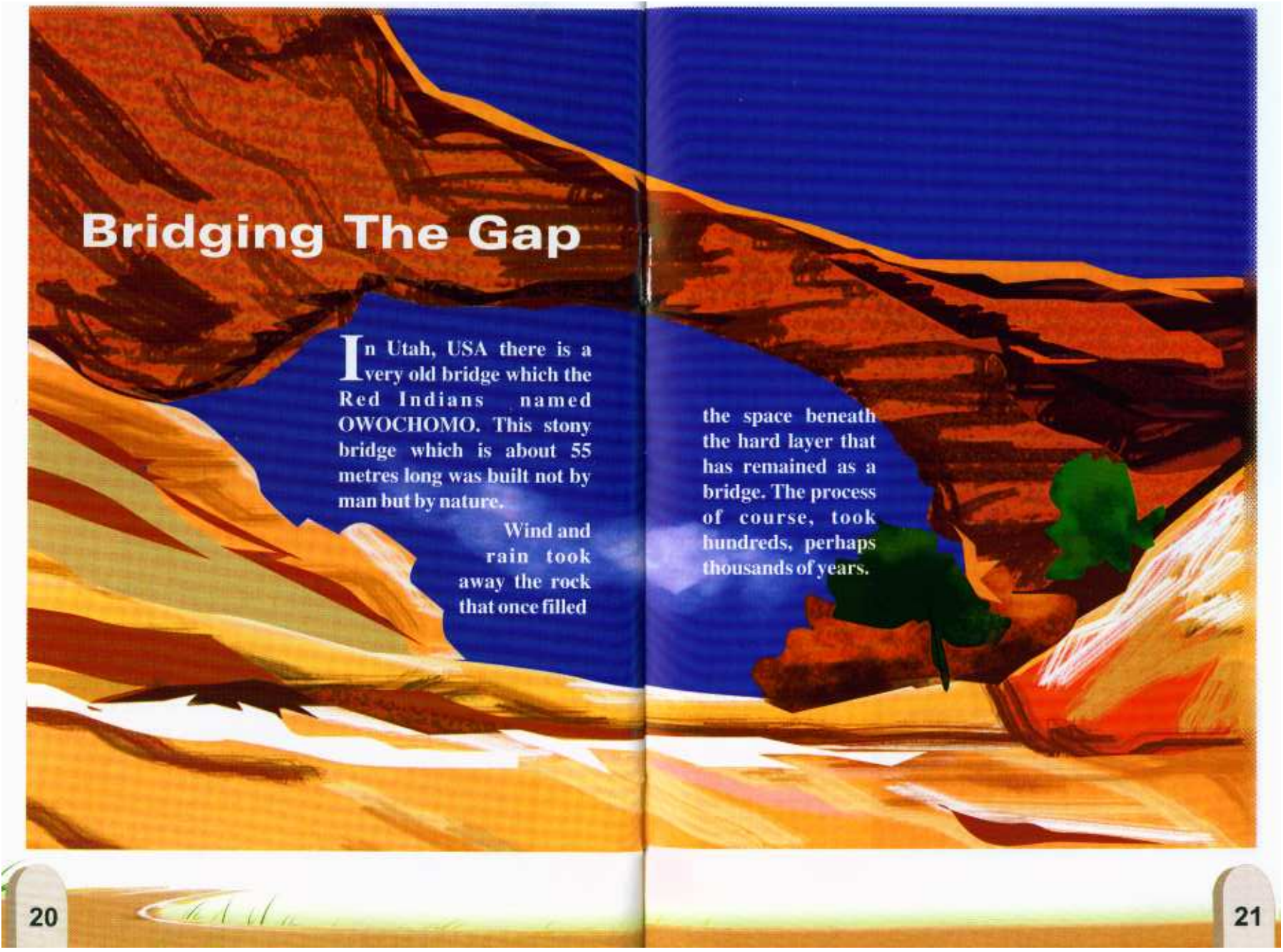
Early Crossovers

The first arch bridge was built in Babylon in 2,200 B.C.

To cross a stream, early man may have either swum across or swung himself over to the other side with the help of vines. Or, he may have placed a log across the stream and walked over to the other side.

Thus, logs and vines served as the first bridges. In some places, naturally formed stone arches were also used as bridges.

Perhaps these naturally formed stone arches gave man the idea to build bridges. Early bridges were made with bricks and stones and shaped like arches.



Bridging The Gap

In Utah, USA there is a very old bridge which the Red Indians named OWOCHOMO. This stony bridge which is about 55 metres long was built not by man but by nature.

Wind and rain took away the rock that once filled

the space beneath the hard layer that has remained as a bridge. The process of course, took hundreds, perhaps thousands of years.

Root Bridge

The people of Meghalaya were among the first to practise bioengineering and biotechnology. They used the roots of the *Ficus elastica* to build bridges to cross rivers. The bridges were made by directing the secondary roots of the tree to the bank across, and fixing the roots to the soil there.



The root bridges vary in length from 15-30 metres. They are strong enough to carry 50 people at a time. The bridges are long lasting. Some of them are over 500 years old.



Cane and Bamboo Bridges

In Assam where cane grows in abundance, tubular bridges made of cane were popular. The bridges were held in place by a series of hoops, and were tied to trees on either ends.

Leiyang's bamboo bridge was erected within a week by a team of eight workers without using heavy construction equipment.

Leiyang, a town in China's Hunan province, holds the distinction of erecting the world's first bamboo bridge on which trucks can ply. The 10-metre long bridge was designed by Yan Xiao, a professor at the University of Southern California's Viterbi School of Engineering.

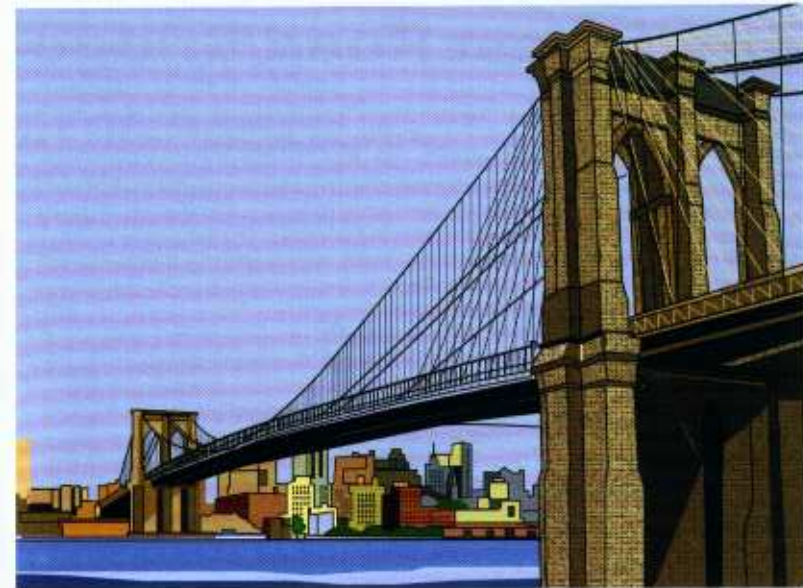
Boat Bridge

Lakshman Jhula is an iron suspension bridge over the river Ganga, in Rishikesh. It is nearly 137 metres long. It was built around 1939.

According to legend, Lakshman had built a bridge out of jute ropes at the very same place.

By the 4th century AD, plaited bamboo and iron chains were used to strengthen bridges.

During the Mughal rule, a large number of bridges were built for military and commercial purposes. Interestingly, many important towns along the banks of rivers had boat bridges or pontoon bridges. These were made by stacking boats side by side and placing planks over them for people to walk on. The pontoon bridges were portable and easy to dismantle.



The Brooklyn Bridge

The Old Coat Hanger

Australia's Sydney Harbour Bridge is over 48 metres wide. It is the world's widest long-span bridge. It has eight lanes of traffic, two overhead railway lines, a cycle track and a walkway. Its central arch rises 134 metres above sea level, making it also the tallest steel-arch bridge in the world.

The bridge is affectionately known as 'The Old Coat Hanger'.

The Brooklyn Bridge across the East River connects New York's Manhattan and Brooklyn districts. It was the first bridge to be electrically lighted and the longest suspension bridge in its day.

The bridge deck measures 478.5 metres across between towers that rise 82.8 metres above the river. Today, there are six lanes for traffic on its 39-metre wide deck, with a million cars crossing daily. It also has a walkway for New Yorkers to stroll, bike or jog.

When completed in 1883, it was hailed as the eighth wonder of the world.

The Tallest Road Bridge

Seven concrete and steel pillars rise gracefully into the sky to hold up the 340-metre high and 2.5 kilometre long Millau bridge, in southern France.

About 23 metres taller than the country's other engineering marvel, the Eiffel Tower, it is the tallest roadway in the world, enabling motorists to drive 272 metres (vehicle height) above the Tarn River valley.

The cables that hold it in place are white, so they disappear against the sky, making it look as if a slim ribbon of road is hanging in the clouds.

The bridge serves as a north-south link between Paris and the Mediterranean. It has reduced traffic congestion around the town of Millau, especially in summer when a large number of tourists make their way to the Riviera on the Mediterranean.



Busiest And Longest

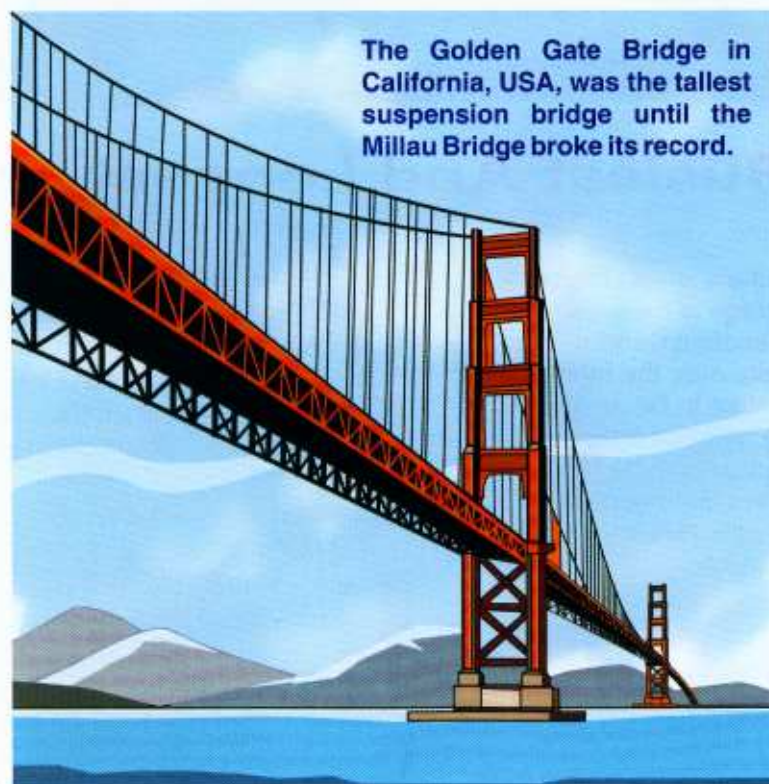
India's longest river bridge is the Mahatma Gandhi Setu over the river Ganga in Bihar. The 5575-metre long bridge with its 40 piers, connects capital Patna to Hajipur.

The Rabindranath Setu over the river Hooghly, in Howrah, West Bengal, is the busiest bridge in India. At least 57,000 vehicles and millions of pedestrians use the bridge everyday.

To reduce pressure on the bridge, the Vidya Sagar Setu was built parallel to it but the Rabindranath Setu continues to be the more popularly used bridge.

Milestones

- **World's Longest Sea Span Bridge:** The 36-km long Hangzhou Bay Bridge in China, connecting Shanghai and Ningbo.
- **World's Longest Floating Bridge:** Governor Albert D. Rosellini Bridge at Evergreen Point, in Washington state. Its floating section is 2,310 m long.
- **World's Longest Suspension Bridge:** The 1,990-m long



The Golden Gate Bridge in California, USA, was the tallest suspension bridge until the Millau Bridge broke its record.

Akashi-Kaikyo bridge in Japan. It can withstand winds of 290 km/h and earthquakes up to 8.5 on the Richter scale.

- **The Longest Steel Arch Bridge :** Shanghai's Lupu Bridge, across the river Huangpo has a span of 550m.
- **The Longest Bridge Across Open Sea In India:** The 234-km long Annai Indira Gandhi bridge with a span of 115.21m, connecting the island of Rameswaram with Mandapam in Tamil Nadu.
- **India's Tallest Bridge:** The Panvalnadi Bridge on the Panval river, in Maharashtra's Ratnagiri district. Its tallest pier is 64m above the river bed.
- **India's Longest Railway Bridge:** The Nehru Setu, near Dehri, across the river Sone, on the Kolkata-Delhi route. It is 3,065km long.
- **The Longest Span Cantilever Bridge In India:** Jadukata Bridge in the Khasi Hills

district of Meghalaya, across the Jadukata river. It has a span of 140m.

- **The oldest Bascule Bridge in India** is in Kidderpore, Kolkata. The bridge is in two halves that are raised to allow ships to pass through.

Longest Road

The 23,175-km long Pan-American Highway is the longest road in the world. It begins in Alaska, passes through Canada, re-enters the US and from Mexico, it goes to Central America all the way down to the western coast of South America to Chile. From there it goes eastwards to Buenos Aires, Argentina and finally ends in Brazil. Except for two gaps in Panama and Colombia, the road is continuous and motorable.

Sidetrack

- The first bridge that was stolen was a four-tonne railway bridge, in the border town of Cheb, in the Czech republic. The company responsible for looking after the bridge, woke up one morning to find that it had disappeared.
- A bridge in Lima, Peru, was made of mortar mixed not with water but with the whites of 10,000 eggs. Aptly called the Bridge of Eggs, it was built in around 1610.
- The most famous bridge in the world is the London Bridge in London. It was made popular in the English nursery rhyme 'London Bridge Is Falling Down'.
- The movie, 'Bridge on the River Kwai' featured the railway bridge in Thailand built by a British Colonel who was captured by the Japanese in World War II.
- The Bridge of Boils at Lima in Peru got its name because while it was being built, an epidemic of bubonic plague broke out among the workmen.
- The Bridge of Sighs in Venice, Italy was so called because condemned men used to sigh as they crossed this bridge on their way to prison.
- The treacherous and turbulent waters of the sea below it gave the Hell Gate Bridge in New York its name.
- The crookedest street in the world is the Lombard Street in San Francisco, USA. Drivers on this road have to deal with 27 degree slopes.



INDIA All The Way

Total road network in India: 3.314 million km

■ National Highways/Expressways,	66,754 km
■ State Highways	128,000 km.
■ District Roads	470,000 km.
■ Rural Roads	2650,000 km

The National Highways Development Project (NHDP)

To improve the condition of roads the Central Government began the National Highways Development Project (NHDP) in 1998.

The Golden Quadrilateral (GQ), North-South & East-West corridor (NSEW) and Port Connectivity which are nearing completion, form the first two phases of NHDP. The 5846-km long GQ connects Delhi, Mumbai, Chennai and Kolkata. The 7142-km long NSEW corridor connects Srinagar in the north to Kanyakumari in the south. The project also includes improvement of the roads connecting the 12 major ports in the country.

When the next five phases of NHDP are completed by 2015, 12,109 km of National Highways will be upgraded, 20,000 km of NH will have two lanes, 6500 km length of NH will have six lanes and there will be 1000 km long Express Highways. National Highways will be supplemented by new roads to serve as ring roads, bypasses, flyovers, elevated roads, tunnels and underpasses.

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